Computer Architecture Experiment

Lab 1: Warmup

Outline

- Experiment Purpose
- Experiment Task
- Basic Principle
- Operating Procedures
- Precaution

Experiment Purpose

- Warmup with what you have learned in the course of Computer Organization
- Try to use the ISE environment skillfully
- Read the user guide of Sparten-3E board, especially the part of LED displayer.

Experiment Task

- Update your Verilog code in Computer Organization to implement and test the multicycle CPU with 9 instructions on Sparten-3E.

- Implement a new MIPS branch instruction and test it's correctness.

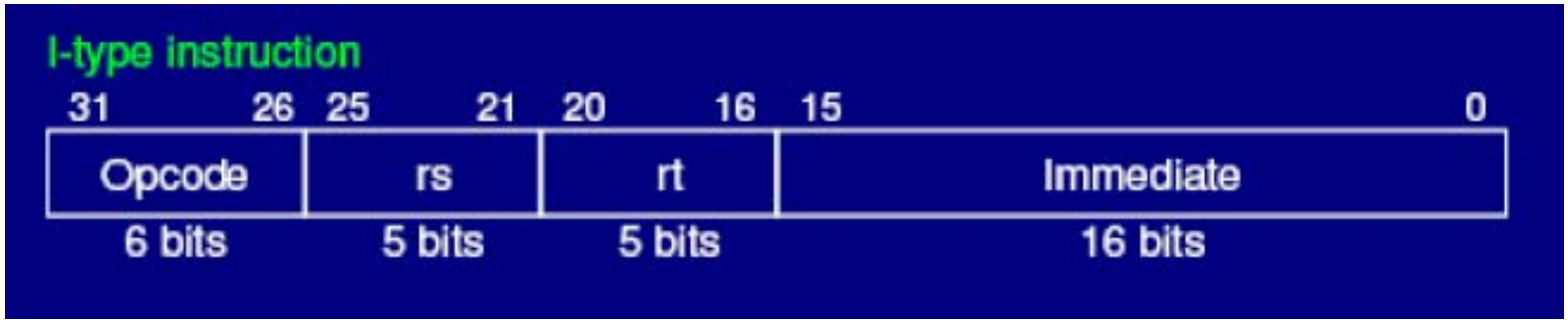
The 9 MIPS instructions

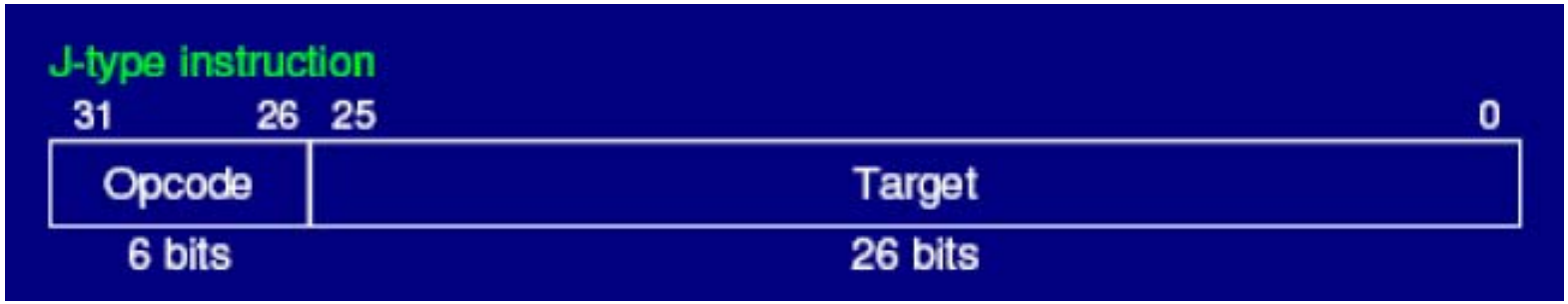
	Instruction bit number					
	31..26	25..21	20..16	15..11	10..6	5..0
add	000000	rs	rt	rd	00000	100000
sub	000000	rs	rt	rd	00000	100010
and	000000	rs	rt	rd	00000	100100
or	000000	rs	rt	rd	00000	100101
slt	000000	rs	rt	rd	00000	101010
lw	100011	rs	rt	immediate		
sw	101011	rs	rt	immediate		
beq	000100	rs	rt	immediate		
j	000010	address				

Branch instructions

Example instruction	Instruction name	Meaning
J name	Jump	PC←name; ((PC+4)-2^{25}) ≤ name < ((PC+4)+2^{25})
JAL name	**Jump and link**	**Regs[31]←PC+4; PC←name; ((PC+4)-2^{25}) ≤ name < ((PC+4)+2^{25})**
JALR R2	Jump and link register	Regs[31]←PC+4; PC←Regs[R2]
JR R3		PC ← Regs[R3]
BEQ R4, R5, name	Branch equal	If (Regs[R4]==Regs[R5]) PC←name; ((PC+4)-2^{25}) ≤ name < ((PC+4)+2^{25})
BNE R4, R5, name	**Branch not equal**	**If (Regs[R4] ≠Regs[R5]) PC←name; ((PC+4)-2^{25}) ≤ name < ((PC+4)+2^{25})**

Instruction format





- Thanks!